

R E M A R K S

Changes to specification have been made to meet objections raised.

Regarding ¶ 4 of the Action:

In claim 1, the outer region is now defined between inner and outer wall surfaces. A helical catalyst can for example be visualized by a thick band extending helically. Claim 5 is therefore clarified. Other '112 objections are believed clarified.

Claim 7 as amended is believed clarified, as are claims 8 and 11. Claim 15 is cancelled.

Regarding '102 and '103 objections, base claim 1 now emphasizes the following:

c) a packed catalyst located within said outer region, and through which reformat gases flow, all of said catalyst extending only helically and about the steam generator, there being flow guide surfaces extending helically adjacent the catalyst between said inner and outer cylindrical surfaces to which said guide surfaces are connected, to direct all gases to flow only helically through the

catalyst between said inner and outer wall surfaces, said catalyst being separated from the flow guide surfaces, the catalyst located entirely outside the generator, said catalyst being continuous in the helical direction of guided flow about the steam generator located centrally in the reactor.

Structural distinctions over Steiner include:

- i) a packed catalyst in a volume as defined,
- ii) there are flow guide surfaces extending helically adjacent the catalyst, between inner and outer wall surfaces to which the flow guide surfaces are connected (see text at page 20),
- iii) all gases are directed to flow only helically through the helical catalyst and between the inner and outer wall surfaces, the catalyst being separate from the flow guide surfaces.

Steiner lacks suggestion of i) since he has no packed catalyst in a volume, as defined. He relies on

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a "turbulator" as at 24, or 224 consisting itself of catalyst material.

He has no packed catalyst separate from his flow guiding turbulator. Steiner lacks ii) because he has no flow guide surfaces separate from his catalyst, and his catalyst is not in a packed volume. Steiner lacks iii) because his gases do not flow through his catalyst, but rather flow adjacent the outer surface of his catalyst on his turbulator. He has no packed volume through which catalyst can flow. Also there is no motivation to reconstruct Steiner in view of Muenger or Collins to meet the above limitations, considering Steiner's "turbulator" and open space teachings.

Regarding Examiner's comments at page 7, lines 5-8, claim 3 clearly recites the catalyst composition. Regarding claim 6, the heat transfer fins projecting into the catalyst from the inner wall, are not suggested by Steiner, or other cited art. Steiner does not teach fins projecting into his catalyst turbulator.

Accordingly, base claim 1 and all dependent claims are believed and urged to define unobvious structures, functions and results and to be allowable.

Inventor's further comments are as follows:

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The invention of Steiner et al (US 4,134,908) describes an apparatus that uses a catalytic turbulator (or thin metal ribbon) which defines a helical or spiral flow path through the reactor. Steiner et al discloses that the catalytic turbulator may be fabricated of nickel, platinum, alloys thereof, or any of these metals plated or deposited on a dissimilar metal prefabricated into the shape of the turbulator (column 2, lines 1-6). The invention of Steiner et al is intended for use in the production of methane by reaction between carbon monoxide and hydrogen, commonly referred to a methanation. The invention of Steiner et al uses a catalytic turbulator to affect the methanation reaction.

Steiner et al further discloses a catalytic reactor (using a catalytic turbulator) wherein the channel in which the gaseous reactants flow is 90% by volume open space (where gases flow adjacent, not through the catalyst) contrasted with the conventional packed bed reactors which typically have about 30% by volume open space (column 2, lines 10-15). Steiner's invention is differentiated from a packed bed catalytic reactor, which has a flow of gases directed through a granular catalyst volume.

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The inventor is unaware of any prior art that discloses catalytic activity of Cu/Zn catalysts fashioned in a catalytic turbulator or ribbon for practical application to the water-gas shift reaction. Therefore, the invention of Steiner et al, which contemplates the use of catalytic ribbons or turbulators, has no practical relevance to the invention of Warren et al.

Allowance is respectfully solicited. The interview on September 26 is acknowledged as is Examiner's Summary.

Respectfully submitted,



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